# AP Statistics Practice Test (page 534)

T8.1 a. The answer is not (b) because we are never certain of the true value; it is not (c) because the confidence interval describes the true proportion, not individuals in the population; it is not (d) because the confidence interval always captures the *sample* proportion; and it is not (e) because 95% of confidence intervals will capture the true proportion, not any particular sample proportion.

T8.2 d. The sample standard deviation is $s_x = 27.838$ so $SE_{\bar{x}} = \dfrac{27.838}{\sqrt{3}} = 16.07$.

T8.3 c. We should not use *t* procedures when the sample size is small ($n < 30$) and there are outliers.

T8.4 d. Using the conservative guess $p^* = 0.5$, the specification is $2.576\sqrt{\dfrac{0.5(0.5)}{n}} \le 0.05$, so we need $n \ge \left(\dfrac{2.576}{0.05}\right)^2 (0.5)(0.5) = 663.5776$. Note that 700 is the smallest sample size that is at least 663.5776.

T8.5 b. Use a $t^*$ with 29 degrees of freedom.

T8.6 a. This is a voluntary response sample so it is not random.

T8.7 c. The margin of error for a confidence interval with 95% confidence will have a larger margin of error, but not more than double the margin of error for a 90% confidence interval.

T8.8 d. Solving $2 \ge 1.645\left(\dfrac{30}{\sqrt{n}}\right)$ gives $n \ge \left(\dfrac{1.645(30)}{2}\right)^2 = 608.86$.

T8.9 e. The margin of error does not include any sources of error other than sampling variability.

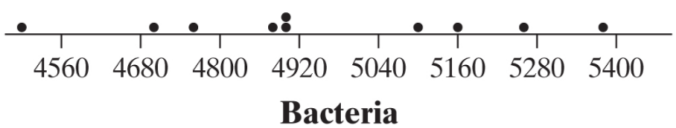
T8.10 d. This interval does not tell us where the population median is for sure, nor does it tell us where individual incomes are. It only provides a set of plausible values for the population median.

T8.11 (a) *State*: We want to estimate $p$ = the true proportion of all visitors to Yellowstone who would say they favor the restrictions at a 99% confidence level. *Plan*: We should use a one-sample $z$ interval for $p$ if the conditions are met. Random: the visitors were selected randomly. 10%: the sample size (150) is less than 10% of all visitors to Yellowstone National Park. Large Counts: $n\hat{p} = 89 \ge 10$ and $n(1-\hat{p}) = 61 \ge 10$. *Do*: The 99% confidence interval is $0.593 \pm 2.576\sqrt{\dfrac{0.593(0.407)}{150}} = (0.490, 0.696)$. *Conclude*: We are 99% confident that the interval from 0.490 to 0.696 captures the true proportion of all visitors who would say that they favor the restrictions.

(b) Because there are values smaller than 0.50 in the confidence interval, the U.S. Forest Service cannot conclude that more than half of visitors to Yellowstone National Park favor the proposal. It is plausible that only 49% favor the proposal.

T8.12 (a) Because the sample size is large ($n = 48 \geq 30$), the Normal/Large Sample condition is met.
(b) Maurice's interval uses a $z$ critical value instead of a $t$ critical value. Using a $z$ critical value is only appropriate if we know the population standard deviation. Also, Maurice used the wrong standard deviation (0.372 instead of 2.576) and the wrong value in the square root—it should be $n = 48$ not $n - 1 = 47$. *Correct*: Because the sample size is 48, we should use a $t$ critical value with 47 degrees of freedom. Using Table B and df = 40, $t^* = 2.021$. The interval is $6.208 \pm 2.021\left(\frac{2.576}{\sqrt{48}}\right) = 6.208 \pm 0.751 = (5.457, 6.959)$. *Using technology*: (5.46, 6.956) with df = 47.

T8.13 *State*: We want to estimate $\mu$ = the true mean number of bacteria per milliliter in raw milk received at the factory at the 90% confidence level. *Plan*: We should construct a one-sample $t$ interval for $\mu$ if the conditions are met. Random: The data come from a random sample. 10%: the sample size (10) is less than 10% of all one-milliliter specimens that arrive at the factory. Normal/Large Sample: The dotplot shows that there is no strong skewness or outliers.




*Do*: We compute from the data that $\bar{x} = 4950.0$, $s_x = 268.5$, and $n = 10$. Thus, df = 9 and $t^* = 1.833$. The confidence interval is:
$4950.0 \pm 1.833\left(\frac{268.5}{\sqrt{10}}\right) = 4950.0 \pm 155.63 = (4794.37, 5105.63)$. *Conclude*: We are 90% confident that the interval from 4794.37 to 5105.63 bacterial/ml captures the true mean number of bacteria in the milk received at this factory.